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DOMINATION AND SOCIAL INTEGRATION IN THE BEHAVIOR OF KINDERGARTEN CHILDREN IN AN EXPERIMENTAL PLAY SITUATION*

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In previous studies with children of pre-school age (1)(2) certain hypotheses regarding the dynamic nature of human relations were verified for an experimental play situation. It was held hypothetically, however, that the same principles of human behavior applied as well to the social and psychological interplay of children of all ages and to adult–child relations. During the past year reliable techniques have been developed for measuring the behavior of kindergarten *teachers* in terms of the defined concepts of domination and social integration. These studies have been reported elsewhere. (3)(4)

The investigation reported herewith constituted a study of dominative and of socially integrative behavior of kindergarten children in an experimental play situation. The methods, materials and definitions of terms were the same as for the previous study of pre-school children. The results have been examined first, for similarities and differences in the behavior of the kindergarten children as compared with the children used in the previous study; and second, for the relation of the findings on kindergarten children to the formulated hypotheses regarding the dynamic nature of behavior.

Definitions of Terms. Briefly, "The use of force, commands, threats, shame, blame, attacks against the personal status of an individual are called dominative techniques of responding to others. Domination is characterized by a rigidity or inflexibility of purpose, by an unwillingness to admit the contribution of another's experience, desires, purposes or judgment in the determining of goals which concern others. — Domination stifles differences; domination attempts to make others behave according to one's own standards or purposes.—Domination involves force or threats of force or of some other form of the expenditure of energy against another.—(Domination is self-protective; it)—is behavior of one who is so insecure that he is not free to utilize new data, new information, new experience. Domination is an attempt at atomistic living; the desires, purposes, standards, values, judgment, welfare of others do not count; it is rugged individualism of a highly in-growing order. Domination is the antithesis of the scientific attitude; it is an expression of resistance against change (or differences); it is consistent with bigotry and with autocracy. It is the technique of a dictatorship."

It should be pointed out that the terms *dominate, dominative, dominating,* and *domination* are used here to designate techniques of behaving. As such they are not to be confused with the terms *dominant* and *dominance.* These latter terms refer to defined relationships which may or may not be achieved by means of the techniques of domination or the use of force or coercion.

If, instead of compelling the companion to do as one says, one asks the companion and by explanation makes the request meaningful to the other so that the other can voluntarily cooperate, such behavior is said to be an expression not so much of pursuing one's own unique purposes as attempting to discover and get satisfactions through common purposes. For such expenditure of energy in common purposes, for an attempt to reduce instead of augment or incite conflict of differences the term *integrative behavior* is used. The person who can change his mind when confronted with new evidence which has grown out of the experience of another is said to be *integrating differences.* Integrative behavior as the term is used here is consistent with the scientific point of view, the objective approach. It designates behavior that is flexible, growing, learning.

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* Read at the meetings of the Midwestern Psychological Association, May 5, 1939, University of Nebraska, Lincoln.

The term integration is not used here as it has been used by some in contrast with differentiation. It is believed that the two processes are inseparable and are merely different aspects of the same psychological or biological phenomenon. With the integration of differences something new is created that never has existed before; this emergence of originals through the integration of differences is itself a differentiation.

Integrative behavior is thus consistent with concepts of growth and learning. It makes allowance in one's own behavior for differences in others. Whereas domination stifles or frustrates the achievement of individual differences, socially integrative behavior respects differences, advances the psychological processes of differentiation. Integrative behavior is flexible, adaptive, objective, scientific, cooperative. It is an expression of the operation of the democratic processes.

Hypotheses. The previous experimental studies offered consistent evidence in support of the hypotheses that:

1. Domination in one child incites dominative techniques in the companion.
2. Integrative behavior induces cooperation or integrative behavior in the companion.
3. Domination as a psychological technique of behaving is not only different from, but where a potential avenue of escape is left open, it is dynamically unrelated to integrative behavior.

It is assumed that short of the extermination of another individual there is no situation in which the interplay is entirely dominative and also that there is no situation in which the interplay is entirely integrative. But

Anderson
Form 2
May 1938

Date ____________________
Group ____________________
Observer ____________________

RECORD OF DOMINATION—INTEGRATIVE BEHAVIOR

Department of Psychology, University of Illinois

Subject A ____________________

Subject B ____________________

	A	B
1. Verbal demands to secure materials		
2. Forceful attempts to secure materials		
3. Succeeds in securing materials		
4. Defends, snatches back materials		
5. Verbal commands to direct c's behavior		
6. Forceful attempts to direct behavior		
7. Succeeds in directing behavior		
8. Criticizes, reproves companion		
9. Shows common purpose by word or action		
10. Verbal request or suggestion to direct c's behavior or secure material		
11. Complies with request or suggestion		
12. Sets pattern including gesture which companion imitates		
Dom. Scores (1–8)		
Integ. Scores (9–12 plus c–11)		

Figure 1.

many situations arise in which the techniques of responding to others can be reliably said to be expressions of domination or of integrative behavior.

TABLE 1

NUMBERS OF CHILDREN USED IN THE PAIRED COMPARISONS

School	Session	Boys	Girls	Total	Total Pairings
X -----	A.M.	8	11	19	30
	P.M.	8	11	19	96
Y -----	A.M.	5	6	11	50
Totals -----		21	28	49	176

Subjects. The subjects used in this study were forty-nine children, twenty-one boys and twenty-eight girls, from three kindergarten groups in two schools. Tabulation of numbers according to sex and group together with the number of pairings is given in Table 1. Most of the children came from homes of superior socio-economic status and practically all were of normal or superior intelligence as measured by the revised Stanford–Binet mental tests.

Methods and Procedure. Children were taken at random in pairs to the testing room where they were allowed to play for five minutes. In the room was a sand box on a low table. In the sand box were a toy sand pail, shovel, sieve, two automobiles, and three rubber toy animals always arranged in the same position when the children arrived. As he led the children into the room the experimenter said, "Here are some toys for you to play with until I come back and get you. We will keep them in the sand box all the time, but you may play with anything you want to." In the morning group of school X most children had two pairings. In the afternoon all children with few exceptions were paired with five others. In school Y also most of the children were paired five times.

Methods of Scoring. The observation blank shown in Figure 1 is based on the blank which was developed for the previous study (2, pp. 350–351). Domination scores in a pairing included all tallies in items 1–8 inclusive. Integration scores included all tallies for items 9–12 inclusive plus the number of the companion's tallies for item 11. The definitions of categories of domination and of integrative behavior in children's responses to each other were taken exactly from the previous study and are not reproduced here. (2, pp. 351–354).

TABLE 2

COEFFICIENTS OF CORRELATION BETWEEN HIGH AND LOW SCORES PER PAIRING FOR CHILD'S WITH COMPANION'S DOMINATION SCORES AND INTEGRATION SCORES RESPECTIVELY; COEFFICIENTS OF CORRELATION BETWEEN DOMINATION SCORES AND CHILD'S OWN INTEGRATION SCORES AND BETWEEN DOMINATION SCORES AND COMPANION'S INTEGRATION SCORES

School	Session	N	r
Domination with Companion's Domination			
X --------	A.M. & P.M.	63	.85 ± .02
Y --------	A.M.	24	.82 ± .05
Preschool[1] --------------		513	.68 ± .02
Integration with Companion's Integration			
X --------	A.M. & P.M.	63	.65 ± .05
Y --------	A.M.	24	.72 ± .07
Preschool[1] --------------		514	.82 ± .01
Domination with Own Integration			
X --------	A.M.	30	.16 ± .12
	P.M.	96	—.08 ± .07
	A.M. & P.M.	126	—.01 ± .06
Y --------	A.M.	48	.16 ± .09
Preschool[1] --------------		1030	—.07 ± .02
Domination with Companion's Integration			
X --------	A.M.	30	.18 ± .12
	P.M.	96	—.23 ± .07
	A.M. & P.M.	126	—.11 ± .06
Y --------	A.M.	48	.04 ± .10
Preschool[1] --------------		1030	—.10 ± .02

[1] Data on preschool children obtained from Anderson (2).

Reliability of Observations by Two Observers.[1] The coefficients of reliability of simultaneous and independent recordings by two observers were .98 ± .02 for domination scores on seventy-eight pairings and .90 ± .02 for integration scores on seventy pairings.

The Dynamic Nature of Interactivity as Shown in Domination and Integration Scores. One way of showing whether there is a dynamic relation in domination scores is to correlate the high domination scores in each pairing with the domination scores of the companion.

Table 2 gives the coefficients of correlation of high domination scores with low domination scores for sixty-three pairings in school X and for twenty-four pairings in school Y. The respective coefficients of correlation are .85 and .82. These coefficients show an even higher relationship between domination in one child and domination in the companion than was found in a much larger number of pairings of preschool children. Table 2 includes also the previously reported coefficient of .68 ± .02 obtained from 513 pairings of preschool children. (2, p. 395).

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[1] The writer was assisted by Gladys Lowe Anderson.

Table 2 gives also the coefficients of correlation of high with low integration scores for kindergarten children in schools X and Y, together with the coefficient obtained in the previous study with preschool children. Sixty-three pairings in school X yielded a coefficient of correlation of .65 and twenty-four pairings in school Y showed a coefficient of .72. These coefficients are lower than, but entirely consistent with, the coefficient of .82 ± .01 obtained from 514 pairings of preschool children (2, p. 397).

This study thus constitutes additional evidence in support of the findings of the previous study. The first two hypotheses mentioned above, that domination incites domination and that integrative behavior in one child tends to induce integrative behavior in the companion, have received consistent support in both investigations.

The Relation of Domination to Integration. Domination scores were also correlated with the child's own integration scores and with the companion's integration scores. Table 2 gives these coefficients for the kindergarten children and reproduces the coefficients obtained previously with preschool children.

Without exception all the coefficients show that in this experimental situation a child's domination scores are unrelated either to his own integration scores or to the integration scores of his companion.

Sex Comparisons. Resumé of Previous Findings. In the previous study of children of preschool age three groups of children were used; one group of Iowa City children superior in intelligence and coming from homes of superior socio-economic status, and two groups of children in an orphanage, one of which (preschool group) attended a nursery school, the other (control) group living in the orphanage but not attending nursery school. When data from all three groups were combined to show sex comparisons of mean domination scores and mean integration scores it was found that girls were more dominating than boys, the critical ratio between the obtained difference and the standard error of the difference being 4.60. It was found also that girls were less integrative than boys, there being ninety-eight chances in one hundred that the obtained difference represented a true difference greater than zero.

Other findings of sex differences in the orphanage children alone may be summarized as follows:

a. The nursery school and control groups of orphanage children showed a consistency of scores in their sex comparisons; they differed only in degree.
b. Girls were more dominating than boys.
c. When sexes were cross-paired, girls decreased in dominative behavior and boys increased in dominative behavior, the difference in the former case being significant; in the latter case there were ninety-two chances in one hundred that the obtained difference represented a true difference greater than zero.
d. Girls and boys were not significantly different in integrative behavior when paired with their own sex.
e. When the sexes were cross-paired, both boys and girls showed decreases in integrative behavior.
f. Boys were slightly more integrative in the cross-pairings of sexes than were girls though the difference was not significant.
g. In cross-pairings, girls showed lower scores than boys in both dominative and integrative behavior. This was true for both nursery school and control groups of children.
h. As regarded total interactivity (the sum of domination and integration scores), the data presented indicated that among these small orphanage children sex differences were already established. (2, pp. 376–388).

Sex Comparisons. Findings of the Present Study. Table 3 gives for the kindergarten children in the present study the mean domination and mean integration scores respectively, together with standard errors of the means and Domination–Integration ratios, for boys when paired with boys, boys when paired with girls, girls when paired with boys, and girls when paired with girls. Table 3 shows also for different comparisons of mean scores the obtained differences between mean scores, standard errors of the differences, crit-

TABLE 3

SEX COMPARISONS IN DOMINATION AND INTEGRATION SCORES. MEANS, STANDARD ERRORS OF THE MEANS, AND DOMINATION–INTEGRATION RATIOS FOR BOYS WHEN PAIRED WITH BOYS, BOYS WHEN PAIRED WITH GIRLS, GIRLS WHEN PAIRED WITH BOYS, AND FOR GIRLS WHEN PAIRED WITH GIRLS

		Domination		Integration		
School X, A. M. + P.M.	Number Pairings	Mean	S.E. Mean	Mean	S.E. Mean	D–I Ratio
Boys with boys	22	4.05	1.09	37.64	3.38	.11
Boys with girls	31	2.90	.68	34.39	2.00	.08
Girls with boys	31	2.87	.67	35.10	1.82	.08
Girls with girls	42	1.43	.33	36.88	1.77	.04

School X, A.M. + P.M.	Higher Mean	Difference	Standard Error of Difference	Critical Ratio	Chances in 100
		Domination			
‡BB with GG	BB	2.62	1.14	2.30	99
BG with GB	BG	.03	.96	.03	52
BB with BG	BB	1.15	1.28	.90	82
GB with GG	GB	1.44	.75	1.92	97
BB with GB	BB	1.18	1.28	.92	82
BG with GG	BG	1.47	.76	1.93	97

School X, A.M. + P.M.	Higher Mean	Difference	Standard Error of Difference	Critical Ratio	Chances in 100
		Integration			
‡BB with GG	BB	.76	3.80	.20	58
BG with GB	GB	.71	2.70	.26	60
BB with BG	BB	3.25	3.91	.83	79
GB with GG	GG	1.78	2.54	.70	76
BB with GB	BB	2.54	3.82	.66	74
BG with GG	GG	2.49	2.67	.93	83

‡ The symbols "BB with GG" indicate that the mean score for boys when paired with boys is being compared with the mean score for girls when paired with girls. "BG with GB" indicate that the mean score for boys when paired with girls is being compared with the mean score for girls when paired with boys.

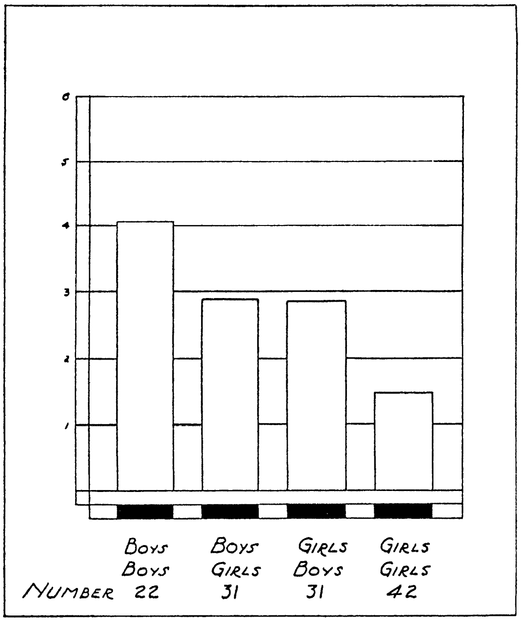
ical ratios, and the chances in 100 that the obtained differences represent true differences greater than zero.

a. *Domination.* Figure 2 shows graphically the mean domination scores given in Table 3, together with a reproduction to scale of the mean domination scores of the orphanage nursery school and control groups taken from Table 21 and Figure 8 of that study. (2, pp. 380, 379)

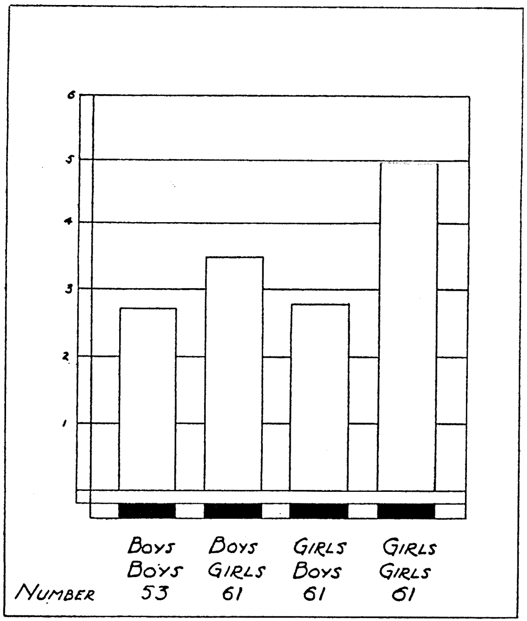
1. *Résumé of the Domination Scores of Orphanage Children.* In the previous study of orphanage children it was found that when a more dominating group was cross-paired with a less dominating group there was a dynamic relation which was sufficient to indicate a tendency toward over-compensation. This dynamic relation together with the over-compensation was shown both in the cross-pairings of the more dominating orphanage nursery school children with the less dominating control group children and in the cross-pairings of the more dominating girls with the less dominating boys. In the cross-pairings of the sexes the orphanage control group showed the same tendencies as the orphanage nursery school children though the changes did not represent significant differences. By way of explanation it was said in the previous report that: "When the little sheep is paired with the big, bad wolf, the little sheep becomes not only less sheepish than the sheep but more wolfish than the wolf. And the wolf becomes more sheepish than the sheep." (2, p. 368).

2. *School X, Morning and Afternoon Groups Combined.* When the data for the morning session were combined with the data for the pairings in the afternoon session, the dynamic relationship of dominative behavior to dominative behavior was still present although there was no tendency toward over-compensation in the cross-pairings.

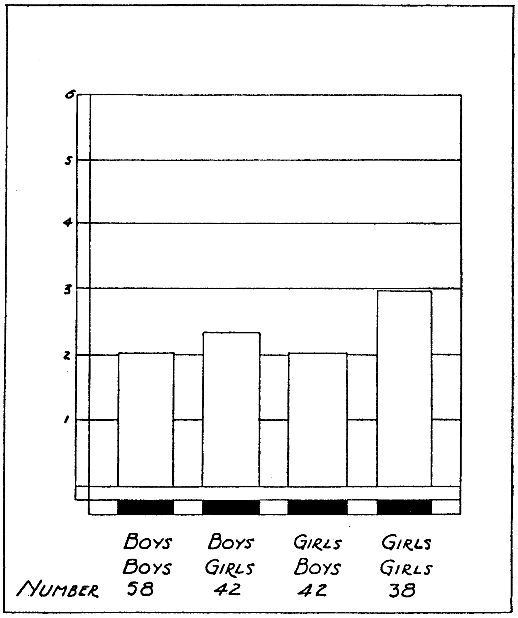
A glance at the domination scores represented in Figure 2 shows that the lowest mean domination scores were obtained by girls when paired with girls. The differences between these scores and the domination scores represented by the three other columns approaches statistical significance in each case. As compared with mean domination scores of boys when paired with boys there are ninety-nine chances in 100 that the obtained difference represents a true difference greater than zero. As compared with the scores for girls when paired with boys there are ninety-seven chances in 100 that the obtained difference is statistically significant.



School X A.M. and P.M.



Orphanage Nursery School



Orphanage Control Group

Figure 2. Mean denomination scores.

b. *Integration.* Figure 3 shows graphically the mean integration scores given in Table 3, together with a reproduction to scale of the mean integration scores of the orphanage nursery school and control groups taken from Table 21 and Figure 9 of that study. (2, pp. 380, 384). In comparing domination scores with integration scores it should be noted that Figures 2 and 3 are not drawn to the same vertical scale. One unit of measurement in Figure 2 is equal to six units in Figure 3.

1. *Résumé of the Study of the Orphanage Children.* In the study of orphanage children the nursery school group was found to be less integrative than the control group in the comparison of homogeneous or own-group pairings. In the cross-pairings between nursery and control group children the same dynamic tendencies toward over-compensation were found as was revealed in dominative be-

These books of low circulation also showed a tendency to moralize: The bee workers were held up as models of virtue, the drones as "ne'er do wells." Animals, plants and even inanimate objects were considered good in as far as they are beneficial to mankind and wicked in as far as they interfere with man's welfare.

The books were then divided into a popular, middle and least used group according to their average circulation in the nine libraries. The books in each of these groups were then compared with respect to subject matter, cover of the book, number of pages in the book, type of illustration used in the book and the proportion of the book given to illustrations.

Books dealing with aviation and books giving experiments in physics and chemistry were especially popular in the libraries. Of the thirty-five books dealing with aviation, twenty were in the popular group and eight in the middle group. Of the twenty-nine books dealing with physics and chemistry, sixteen were in the popular group and eight in the middle group. Books dealing with astronomy, animals and machines were also popular in the libraries.

There was no noticeable difference in the circulation of books with respect to the cover of the book. It is possible that the same book in two different covers would circulate differently, or that children will be more particular about the cover of a book they are to own than one they are just borrowing from the library. Also the cover of a book may affect its circulation when it is first put on the library shelves, but there was no evidence in this study that the cover of a book made an appreciable difference in its circulation over the period of one year.

On the whole, books with fewer pages circulated more frequently than longer books. This may be due to the fact that it takes longer to read a longer book. The fact that of the seventeen books with over 400 pages, seven were in the highest group of circulation and eight in the middle group, while of the eighty-two books with less than one hundred pages, forty-six were in the popular group and twenty-one in the middle group would seem to indicate that factors other than length are affecting the circulation of these books.

With respect to illustrations, books with colored illustrations seemed to be the most popular, while those with photographic illustrations were a close second. Books with other types of illustrations seemed to circulate about equally. However, it was noticeable that clear cut illustrations dominated in the popular group. There was a more noticeable difference with respect to the proportion of the book given to illustrations. Half of the books with an illustration on every other page were in the popular group. However, thirty-six per cent of such books were also in the least used group. These books seemed to appeal chiefly as picture books. Again the clear cut illustrations were the popular ones. There was no apparent difference in the circulation of books giving other proportions of the books to illustration.

A brief survey of the above data would seem to indicate that: books dealing with aviation, physics, chemistry, animals and astronomy are more popular than other books; color of the cover, and the number of pages are negligible factors; colored and photographic illustrations are preferred to other types of illustrations; books with many illustrations are preferred to books with few illustrations.

OBSERVATIONS OF CHILDREN'S RESPONSES TO VARIOUS SCIENCE BOOKS

The foregoing procedure represents an indirect method of approaching the question. The adult examiner may have missed the crucial features of the book from the child's point of view. To ascertain the elements in the books that attracted or repelled children, ninety-six children were observed while using a selected group of books. The children were in the fifth and sixth grades of the School of Practice of the State Normal School, located at Potsdam, New York. The thirty-five books were chosen from the larger list of books covered in the first part of the study. The limited list represented each of the fields of science and each of the circulation groups discussed above. Table I gives the list of books used in the study and their group according to library circulation. Each of these books was graded by the Washburne and Vogel method of determining the grade difficulty of a book and on the Bamberger *Score Card for Evaluating the Various Factors in the Physical Make-up of a Book for Primary Children.* Each of the children was given the *National*

TABLE I

BOOKS USED IN THE STUDY WITH CHILDREN AND THE GROUP OF LIBRARY CIRCULATION IN WHICH EACH BOOK WAS FOUND

Author	Title	[1]Group in Library Circulation
Beard	American Boys Book of Wild Animals	L
Burgess	Animal Book for Children	M
Burns	Animal Fair	P
Collins	Experimental Chemistry	P
Daglish	Fishes and Other Sea Animals	M
Ditmars	Prehistoric Animals	M
Dopp	Later Cavemen	P
Doubleday	Birds Every Child Should Know	M
Fabre	Book of Insects	L
Gall and Crew	Wagtail	M
Hawks	Shaggycoat	M
Hawksworth	Strange Adventures of a Pebble	L
Haynes	Our Electrical World	M
Hegner	Parade of the Animal Kingdom	P
Henderson	Children of the Tide	L
Johnson	Stars for Children	L
Kearney	Strange Fishes and Their Strange Neighbors	P
Kenly	Green Magic	M
Kummer	First Days of Man	M
Lent	Wide Road Ahead	M
Mathews	Book of Birds for Young People	P
Mingos	Flying for 1937	P
Morgan	First Electrical Book for Boys	P
Morley	Bee People	L
Morse	Creepers and Sliders	P
Patch	Holiday Hill	M
Patterson	Spinner Family	L
Petersham	Storybook of Wheels	P
Pryor	Trainbook	P
Reck	Automobiles from Start to Finish	P
Reed	Stars for Sam	P
Rogers and Beard	Heels, Wheels and Wires	M
Rush and Winslow	Modern Alladins and Their Magic	L
Seton	Lives of the Hunted	L
Washburne	Story of Earth and Sky	M

[1] P—popular group; M—middle group; L—least used group.

Intelligence Test Form A and the Detroit Reading Test Form A. The children ranged in mental age from nine years and two months to seventeen years and four months, in reading score from 4B to 9A. Among the parents of the children were farmers, day laborers, business men, professional people and people on relief. There were children who liked to read and children who did not like to read. Most of the children habitually engaged in some form of out-door activity.

For the observation part of the study, the thirty-five books were placed on a long table in a room. The children came to the room in groups of fifteen to twenty. The investigator told the children that she was a science teacher; these books were science books; she wished to know what boys and girls liked in science books. She would like to have the children look at these science books. She would like to have them choose some books they would like to read or look at more closely. They could take such books to a table or chair and use as they wished.

The children circled around the table and looked at the books as they lay there. It was interesting to note that each child in time thumbed through the pages of all the books. Yet at the end of about ten minutes they had each decided upon a book to use. Enough copies of each book were provided so that each child could have every book he desired sometime during the study. On each of the following periods the books were on the table when the children entered the room. They took any book they liked and used it as they wished. There were two other long tables in the room and two small square ones. There were enough chairs for each child to have one. The children sat where they wished, some even ignoring the chairs and standing by the windows to read. The small tables were especially popular with children who wished to use one copy of a book together.

While the children were using the books, the observer stood or sat at the back or side of the room with a magazine and a secretary's notebook. She noted each overt response to a book and the name of the child making the response. When a child discussed the text or illustrations of a book with another child she recorded verbatim their remarks and questions. Each five minutes the time was indicated in the notes so as to give an indication of the time spent on the various books or discussions and the time spent reading between such discussions. The observer's watch had a second hand so she could time individual reactions within half a minute. The results of the observer were checked twice by a second observer.

The children were accustomed to a fairly free set-up in the school room and to the presence of adults engaged on other work in the room. After the observer had explained what she wished them to do for her, they gave her very little attention. They would approach her for the pronunciation of a word, the meaning of a phrase, for the explanation of an illustration, to ask if a certain statement were true or not, to have her settle an argument between two or more of them, to show her particularly attractive illustrations or read her choice selections from the text. Only one child showed any interest in her activity or consciousness of it. He was a fifth grade boy who asked what she read in the magazine and what she wrote from it. He took the magazine, which happened to be a current issue of *The Nation,* thumbed through the pages and asked if there were any science in it. He then thumbed through a few more pages, sighed and returned to his science book. The children seemed to be of the opinion that the observer was busy with work of her own while they looked at books. Since it is a fairly common practice for adults to do other work while the children have a free reading period, it seems reasonable to accept the children's apparent reaction.

At the end of the period the reactions of the children to the various books were compiled. From these specific reactions the author could learn those elements of a book to which the children made an overt response. She could see which illustrations caused them to laugh; what facts they shared with other children; what books they read alone; what books they ignored. She could see those elements to which they gave overt disapproval and those factors in terms of which they *recommended* books to each other.

INTERVIEWS WITH CHILDREN

These observable reactions represent only a part of a child's response to a book. They were significant because they were spontaneous. But the child may have liked elements he did not discuss with other children. Some children are more social in all their reactions than others. Some children are more inclined to try to influence the choices of others. Why did the children pore over one illustration and skim quickly past another? Did a child prefer the book he recommended to another child to a different book with which he spent an even longer period of time? To find what the children themselves believed to be the attractive features of a book, a personal interview was held with each of the children. For this interview one copy of each book was placed on a table. The child took from these books those which he knew and had used. No effort was made to have a child discuss any book which he did not choose. The child was then asked to arrange the books in the order in which he liked them. Most of the children spent quite a bit of time in arranging the books. Usually the most favored three or four books were placed in position very quickly. The children were much slower in arranging books at the lower end of the list. They usually thumbed through the pages of each of these books and read a bit here and there, as though they wished to recall the books more clearly to mind. It would seem that they remembered better those books which they liked.

The interviewer listed the books in the order in which the child arranged them. Beginning with the best liked book the child was then asked to state what he liked or disliked about each book. Most of the children gave definite and concise answers to this question, but a few merely answered, in general terms, to the effect that the book was interesting. To these children, the interviewer said, "Yes, but I want to know what makes it interesting to you. Another boy or girl might not like this book." A few of the children began to recount the material in the book. To these children the interviewer said, "Yes, that is what the book is about, but I want to know why you like the book. What is there in or about this book that you like?" In answer to these questions most of the children gave definite answers. In case a child was still not specific about any book, no further effort was made to cause him to give a specific statement.

None of the children was as articulate in stating reasons for disliking a book as in giving reasons for liking a book. Many of the children simply said, "I don't know why. I just don't like it." or "I don't know. I just didn't get interested in it." Several children did, however, give specific reasons for disliking special books. The interviewer took down the responses of the children verbatim.

After the last book had been discussed in this manner, the child was asked to arrange the books in the order in which he liked the illustrations. The interviewer listed the books in this order. The child was then asked to state what he liked or disliked in the illustrations and his responses were recorded verbatim. These responses were compiled according to books. A study of these responses and of the overt reactions of the children to the book revealed some factors of a book in the field of science which attract or repel children.

Judging from both their overt and verbal reactions, the subject matter of a book is of crucial importance to children. They mentioned it in recommending a book to other children. They asked the observer if she had any books on special subjects that interested them. In discussing the book in the interview their first response usually referred to the subject of the book.

One girl responded about one of the animal books, "Why its about animals."

Then she added slowly, "I guess I'd like any book about animals."

A fifth grade boy remarked in discussing a book about automobiles, "I love automobiles. I love new style automobiles and first automobiles. I love racing automobiles and all kinds of automobiles."

Boy after boy remarked that he liked airplanes or was interested in aviation.

Different children have different interests. But most children have many interests and many subjects appeal to most children.

Animal books were popular with most though not all of these children. They pored over animal books, shared the illustrations and the factual content with each other, and even supplemented the material in some of the books with experiences of their own, during the observation part of the study. In discussing the animal books in the interview, the fact that it was about animals or about a specific animal, such as a frog, beaver or fish, was given as a reason for liking the book.

Mammals and snakes were the most popular of the animals, but birds, fish, bees and prehistoric animals had their adherents, and one sixth grade girl said that Protozoa were the most interesting. This girl, during the observation part of the study, had read the entire chapter of Hegner's *Parade of the Animal Kingdom* that was given to Protozoa, had pored over the illustrations and had gone back to the section several times, so her observed reactions agreed with this statement.

One girl remarked that she liked "big animals the best, especially those that kill people."

Judging from the time spent on these animals during the observation part of the study and from their comments as they talked with each other, many children shared this interest.

Animal books that told how the animals lived, how they procured their food, cared for their young and protected themselves from their enemies were especially popular with these children.

One sixth grade boy remarked in discussing Hawk's *Shaggycoat,* "It was swell. It told how they did things every day."

In referring to Gall and Crew's *Wagtail,* a fifth grade girl said, "It told more about frogs than any book I ever read."

This information was valued especially high if it dealt with a phase of the subject with which the child was previously unfamiliar.

Again and again children rated books high because "It told me so many things I didn't know."

Usually a specific fact was mentioned as an illustration of this characteristic of the book; for instance the fifth grade boy who liked Kenly's *Green Magic* because, "It told about plants that look like animals. I didn't even know there were such."

The negative side of this same appeal is found in several children who rejected Patch's *Holiday Hill* because in the words of a sixth grade girl, "It didn't tell enough about snakes or plants or anything."

A sixth grade boy expressed the same opinion and then added, "I think it was written for girls."

One boy remarked that Morse's *Creepers and Sliders* was "too darn short."

Strange animals were very popular. Maybe they aroused an interest that makes the animals rival the clown in popularity in a circus parade or sends hundreds of children each holiday to the various zoos throughout the country. However that may be, these animals were popular in every book in which they appeared. The illustrations and the facts concerning them were shared and discussed during the observation part of the study and they were pointed out to the investigator during the interview.

A fifth grade girl finished her discussion of Ditmar's *Prehistoric Animals* by saying, "It's a strange book. I never read anything quite like it before. I like it. I like it better than common books. It is more interesting."

Another fifth grade girl expressed her pleasure in the same book and said, "It had such queer animals. Some I never dreamed of before, not even at night."

On the other hand, pets also made a strong appeal to these children. Child after child pored over the illustrations of such animals. They described various pets they had owned or known to each other. They discussed the merits of various animals as pets, ranging from snakes to monkeys. During the interviews similar reactions were noticed.

The classification of the animal kingdom also intrigued these children. Every child discussing Burgess' *Animal Book for Children* in the interview referred to this information in some way. During the observation part of the study they discussed the various related animals with each other.

During this part of the study one fifth grade girl called the observer to her and asked, "Are owls and eagles the same thing?"

The observer replied that they were two different birds and turned to get a book showing illustrations of each.

But the child continued, "Yes I know that. But do they belong together? Are they related like this says some of the animals are?"

Books dealing with airplanes, automobiles, trains and wheels, especially those which told how the machine was made or how it worked, were popular with these children. They showed the illustrations in these books to each other. They discussed the workings of the various machines and compared their various advantages.

During the interview one fifth grade girl said about Pryor's *Trainbook*, "It tells how trains are run. It tells about the people riding on the train too, but mostly how it runs and that's why I like it."

In the interviews, the assembly line was declared the best part of Lent's *Wide Road Ahead*. The car being pushed over the cliff as part of the testing program was also pointed out. Much time and attention was given both these sections during the observation part of the study. When one child read aloud that a car was made in fifty minutes a lively discussion followed.

Finally one boy seemed to crystallize the thinking of the group by saying, "They couldn't make a car in fifty minutes if they didn't have everything ready."

Aviation was especially popular with the boys, but none of the girls referred to aviation books in the interview. During the observation period, a few girls tried to read Mingos' *Flying for 1937*, but they seemed to lack the necessary background for understanding the book. Judging from their reactions, there is need for a simple book on aviation that will explain the mechanical working of an airplane to a girl who does not know an amphibian plane from a hydroplane, nor any of the other seemingly obvious facts and terms.

Seven of the boys wished to be aviators. They were delighted with the information given concerning the training of pilots. As was noted concerning the animal books, it was the facts they had not known before that especially interested the children. One girl in discussing Pryor's *Trainbook* worded it, "There were some things in the book I didn't know. I liked that part. When I read the part I already knew like getting on trains and the things that are on trains, I didn't care about it."

Strange or unusual machines such as the rollers of the Egyptians or the Chinese Wheelbarrows (Petersham's *Storybook of Wheels*) delighted many children.

The historical development of machines from the simplest to the most complex interested these children. This fact was mentioned in the interview in discussing every book that traced this development. It was mentioned even in reference to Lent's *Wide Road Ahead* and Reck's *Automobiles From Start to Finish,* which give but a small proportion of their contents to this subject.

In discussing Petersham's *Storybook of Wheels,* one boy expressed this interest in the words, "I like to know how the first wheels were made, how the early wagons were made and how they changed up to the present."

Numbers and size interested many children. They seemed to make a definite effort to visualize unusually large or small things. One group of fifth graders discussed the number of cars in the parking place at Jones' Beach. They reached the verdict that there were more cars in that picture than children in their school but not as many as people in their town. Two of the boys endeavored to count the cars, but neither finished the task. The huge press for stamping out the steel bodies of cars (Reck's *Automobiles From Start to Finish*) caught the attention of the children. Four boys changed the 750 tons to pounds to see how much that "really was". The size of the dinosaurs was estimated in terms of school rooms, that of the hippopotamus in terms of blackboard slates.

Efforts to motivate the reader by talking about the subject or discussing the wonders of science or the glories of nature were uniformly rejected by these children. Facts presented in simple, direct form were much preferred. The children seemed to have a real interest in science and efforts to dilute it were frowned upon.

One boy said in discussing one such book, "You have to read too much to find out what you want to know."

Efforts to make a book more attractive through the use of personification were ignored or disapproved of by these children.

In discussing Gall and Crew's *Wagtail* a fifth grade girl remarked "It was silly to have the frogs talk."

During the observation part of the study, a fifth grade boy called the observer and showed her an illustration of a garter snake called "Sir Talis".

"Is that a garter snake?" he asked.

On being answered in the affirmative he said, "Then why didn't they say so?"

None of the children commented favorably upon this device.

The use of a story in the presentation of factual material received two different responses. A story which had adventure and convincing characters was liked. One which was merely a chronical of events or a framework for presenting facts was ignored if the story was so insignificant that the child could gain the factual content without becoming too conscious of the story element. If the story took much space in the text, or if the characters interrupted explanations with questions of their own or in any other way interrupted the presentation of factual material these children objected to the story.

Adventure in itself was attractive to the children. Many children remarked they liked a book because it was exciting or because the animal or people had adventures. Even more children told certain exciting incidents from the text as examples of the book's appeal. Even books which were not narratives, such as Washburne's *Story of Earth and Sky* and Roger and Beard's *Heels, Wheels and Wires* were described as adventurous.

In discussing the former a sixth grade girl said, "Time they got near the sun they were all hot and bothered. They could hardly breath and neither could I."

The device of having an adult or other character give information to a child character was ignored or disapproved of by these children. In books such as Pryor's *Trainbook* or Lent's *Wide Road Ahead,* this feature of the book was minor enough to be ignored. When the characters intruded more noticeably into the text the children objected to them.

In discussing such a book one sixth grade boy remarked that he liked "about the stars" and he liked the legends but he didn't like "the characters".

Humor both in the text and in the illustrations was popular with these children. Play on words, odd looking animals or people, absurd machines or situations were funny to the children. There was a noticeable difference in the things which children of different maturity considered funny. The more mature children were delighted with the rhyme of the great fleas that had little fleas and the description of the kissing amoeba in Hegner's *Parade* *of the Animal Kingdom;* with the decision of the judge in Roger and Beard's *Heels, Wheels and Wires* that the potter had a right to take clay from the road for his work. The cat who should diet and the pig with a clean face in Burns' *Animal Fair* pleased the less mature children. Old fashined cars and the need "to get out and get under" (Lent's *Wide Road Ahead*), the efforts of the Indians to stop a train with a rope, and Johnny Bear with the syrup can (Seton's *Lives of the Hunted*), amused all of them.

Books that told how to make or do things were popular. Morgan's *First Electrical Book for Boys* was rated high because "It's all about electricity. It shows you how to make nice things, like little gadgets and telegraph sets." Mathew's *Book of Birds for Young People* and Doubleday's *Birds Every Child Should Know* were recommended because "you could tell the birds when you see them."

However, such books are likely to be of value and prized by children only if the necessary materials with which to work are available. Morgan's *First Electrical Book for Boys* and Collins' *Experimental Chemistry* were equally popular in the library circulation. The materials for the experiments of the first book were available to some of the children. These individuals were enthusiastic about the book. None of the children had access to the materials for the experiments in the chemistry book. Only two children (both girls) used this book. One seemed to try to work the experiments imaginatively, but she was not satisfied with this makeshift. The other copied some of the experiments and tried them at home, but "couldn't get it very well".

The children leaped across the boundaries of grades with no apparent hesitation. One sixth grade girl remarked rather apologetically that Burn's *Animal Fair* was too young for her but added emphatically that she liked it. One boy pronounced Burn's *Animal Fair,* Petersham's *Storybook of Wheels* and Pryor's *Trainbook* babyish. He had been slow learning to read and seemed still to be judging the difficulty of a book by the number of pages and the lack of illustrations. The other children ignored this feature of a book entirely. Every child with a ninth grade reading score included some fourth grade books among his favorites. On the other hand, all of the children except those with ninth grade reading scores (there were no books rated above ninth grade in difficulty) included some books above their reading score among their favorites. Most of these children would try to read any book that interested them regardless of its vocabulary difficulty. A boy with a fifth grade reading score read Mingos *Flying for 1937* (ninth grade difficulty). He read very slowly, reread much of the material and asked for the meaning of many words but he read the book.

In fact, difficulty of concepts that were presented seemed to trouble these children more than difficulty of vocabulary as such. Reed's *Stars for Sam* seemed too difficult for children with a mental age of less than twelve years or with only a fair background in astronomy, regardless of their reading scores.

Illustrations seemed to be an integral part of the book to these children. They were not, however, regarded by all as indispensable. In fact, one boy remarked that a book could be good, "even if it didn't have any pictures." But if they were present they were a part of the book to which the child responded. Some of the books were chosen and became favorites because of their pictures. The children preferred realistic pictures. "They look so real," was their most common recommendation of such an illustration, or they might say, "They look so much like the animal (car or whatever the child was discussing) really looks." They seemed to have more confidence in such illustrations. Pointing to an illustration of a red fox, one boy said, "Now that really looks like a fox. Now I never saw this animal (pointing to an illustration of a hyena) but it probably looks like that."

Photographic illustrations were especially liked. One boy said, "Photographs are the best," and another, "They look as though they had been taken not as though they had been drawn," while a third boy complimented the illustrations in Seton's *Lives of the Hunted* by saying, "They are most as good as photographs."

However it was only the best of the photographic work that appealed to these children. "Just pictures" were promptly dismissed as such. The animal should be alert, preferably doing something. The parts of the car must be clear and distinct. The pictures were preferred because they were real and the young reader wanted the details. For example, Kearney's *Strange Fishes and Their Strange Neighbors* was commended because "you can see the stripes, and the spots, and the fins, things you can't see in lots of books."

The essential requirement seemed to be that the illustration conveyed meaning to the reader. Such pictures were popular regardless of the medium used. On the whole these children did not like line drawings. They referred to them as "just sketches". One fifth grade girl remarked, "I like to watch people make sketches. But I don't like them in a book." This seemed to be the general attitude of all the children. But the line illustrations in Morse's *Creepers and Sliders* were very popular because "You can get the story from the pictures."

Remarks such as, "You couldn't get it so good from just the reading;" "The pictures show you just what he means;" "I learned a lot from these pictures;" showed the tendency of these children to use the illustrations as a source of information. They seemed to feel the photographic ones were the most reliable. One boy said "A photograph shows you how it really is. An artist might paint it different." Yet any picture that conveyed meaning to them was accepted, while one sixth grade girl rejected a book because "I couldn't understand it, not even the pictures."

The children liked pictures of strange or unusual things, such as prehistoric animals, or animals of foreign climes, machines and customs of foreign lands. One boy said in discussing the illustrations of Petersham's *Storybook of Wheels,* "I like the pictures of things you don't usually see."

In the same manner charts, diagrams and maps were popular. The children studied them at length during the observation part of the study and commented on them in the interview. However, they must be understandable and usable from the childs point of view. This aspect of the subject was constantly stressed in the interviews. One boy remarked about Morgan's *First Electrical Book for Boys,* "The pictures tell you how to fix things. You couldn't make batteries or anything without the pictures."

Color was liked especially if it added to the information conveyed by the picture. This was especially true with respect to the bird books. "You needed the colors to see what the bird really looked like." On the other hand, most of the children announced that the photographs were better not colored because, "if it were colored you would lose some of the details."

These children seemed to feel that the illustrations and the text should supplement each other. This point was illustrated by such remarks as: "The explanations help you understand the pictures;" "The pictures and reading together give you a good idea;" "You can get a lot from just the pictures, but more if you read the reading too;" "The pictures and the reading go right together."

A Study of Adult Judgments Concerning Children's Science Books

For the purpose of discovering adult reactions to the thirty-five books used in the study, 131 normal school students of the Potsdam State Normal School were asked to rate each book, "A" if they thought it would be enthusiastically liked by children, "B" if they thought children would like the book very much, "C" if they thought the book would be liked only fairly well by children, and "D" if they thought children would be indifferent to it or even dislike it. They were also at another time asked to indicate their own reaction to the book in the same manner. One group of the adults indicated their opinion of children's reactions first and their own reaction second. The other group reversed this order. There was no apparent difference between the responses of the two groups.

As has been noticed in previous work along this line, adult opinion is not a good indication of children's taste. Hegner's *Parade of the Animal Kingdom* was one of the most popular books used in the study. Yet only 29 percent of the adults felt this book would appeal to children. Some of the adults were even quite emphatic in their opinion that children would not care for it. Adults do not seem to be sufficiently critical in judging children's books. Some books that fell in the middle group judged by any one of the three methods used in studying children's reactions were rated "A" or "B" by over 75 percent of the adults. There were eight books in the study which judged by any one of these three methods fell in the least used or liked group. Yet every book was rated either "A" or "B" by at least 27 percent of the adults.

The adults seemed to take the presence of a story as a factor that would insure children's liking and they seemed to be more affected by the format of a book than were the children. Of the three books rated "A" or "B" by over 90 percent of the adults, two have colored illustrations and one has photographic illustrations. The pictures in all three are appealing and were rated high by both children and adults. Seven of the ten books rated "A" or "B" by 75 percent or more of the adults had bright colored covers. Both Hegner's *Parade of the Animal Kingdom* and Mingos' *Flying for 1937* which were rated high by children and low by adults had more subdued colored covers. On the whole, the twelve books rated "A" or "B" by 68 percent or more of the adults are more attractive in format than the other books. The covers are bright, the type large and the illustrations clear.

On the whole, there was a better agreement between the books which *adults themselves liked* and those children liked than between those *they thought children would like* and the ones children liked. Seventy-three percent of the adults liked Hegner's *Parade of the Animal Kingdom* as contrasted with the 29 percent who thought children would like it. On the other hand the narratives that were popular with children were not so with the adults.

Comparison of Published Book Reviews and Children's Responses

A further study of adult reaction to these thirty-five books was made through the published reviews of the books. One hundred thirty-two book reviews were considered. Each of the books reviewed was considered good by the reviewer. Since he was discussing books for prospective customers, books which the reviewer did not consider good were not discussed. In this study, the adult judges fared no better than in the study just described. Many of the reviewers remarked that the book would interest children, that it was attractive or even fascinating. Among the books so described were books found in the least used and least liked group by each of the three methods used in studying children's reactions.

The reviewer usually indicated something about the subject of the book. However he gave little if any attention to the development of the subject or to how it was treated. Only seven of the 132 reviews gave a picture or idea of the subject and content of the book as a whole. Yet this aspect of the book was most important to the young readers whose behavior was studied in this investigation.

On the whole, the illustrations received but very little attention from the reviewers. Some merely stated that the book was illustrated. Most of these indicated the type illustration used. But only a few described the content of the illustrations; very, very few indicated that the child could get information from the illustrations, and none discussed the type of information thus to be secured. Yet this feature of illustrations was important to children.

Personification and the use of a child character to whom the scientific information of the book was explained were frequently mentioned as attractive features of the book reviewed. Yet the children of this study indicated a dislike for both these devices.

Eight of the reviewers remarked that a book was good for a boy. Among these books were Reed's *Stars for Sam*, Reck's *Automobiles From Start to Finish* and Lent's *Wide Road Ahead*. All of these books appealed to the girls as well as the boys in this study.

In short, the reviewers of these books seemed to consider those elements that appeal to the adult purchaser rather than those which appeal to the child reader.

Summary

The results of this study indicate that in the field of science literature, children like books that are rich in factual content; books that present material that is new to the reader; books that tell of the habits, adaptation and peculiarities of animals; books that tell how machines are made and work; stories that are strong and vigorous; stories in which the characters have convincing personalities; and books that tell how to make and do things when the materials necessary for the use of such books are available to the children. The use of personification, the practice of motivating the reader by discussing the importance or wonders of the subject, the use of a character to ask questions and to receive the information which the author wishes to present are at best questionable devices for securing a child's interest and may prove detrimental.

Illustrations are treated as an integral part of the book. They are valuable when they convey information or meaning to the reader. Pictures which failed to do this were rejected. Realistic illustrations were preferred and photographic illustrations were the most popular of these. Colored pictures were preferred if the color added to the information conveyed by the illustration. Charts, maps and diagrams were liked if they were simple enough and clear enough so that the children could understand and use them.

On the whole, adults when judging a book for children seemed to be affected by the format of the book and devices to make the content attractive rather than by the content itself. Children, in choosing books and reacting to them later, seemed to be more affected by the actual content of the book. Published reviews gave a relatively poor indication of a book's actual appeal to children or of the features of the book that appeal most to children. Adults' ratings of books on the basis of *their own liking* for them showed higher agreement with children's interests and ratings than did adults' ratings of books in terms of whether they *thought* children would like them.